Dickson (S. H.)

On Certain Morbid Conditions

OF THE

SENSORIAL SYSTEM:

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The study of the Phenomena of Diseases constitutes a vast field of observation and record. They manifest themselves by signs and symptoms which, on the one hand, may only affect the consciousness of the subject, and on the other, such as may become obvious to those about him. These latter, the palpable tokens by which we recognize its presence, it behooves us to regard with special consideration.

No differences among individual men are more remarkable than their several habits of attention, of observation, of vigilance, apprehension, promptness; their curiosity to see and know, their inclination and capacity for inquiry. We meet occasionally with natural-born policemen, sagacious detectives, lawyers dreaded for their shrewd cross-examinations; and, in the ordinary affairs of business-life with a class noted for watching the currents in motion

around them, and swift to avail themselves of their advantage over those who may be deficient in these useful qualities. Thus, in the sick-room, while one Physician will consume his own time, and wear out the patience of his suffering client by vague and inconclusive questioning, another will, at a glance, discover and fix upon some circumstance which will serve to guide him in his investigation; notice some wandering look, some movement, some disorder of condition, some departure from familiar and natural modes of thought, speech or action. In certain instances we shall be forced to admire the rapid and almost magnetic affinity thus established between them, to the great delight and hopeful excitement of the sick man, who is always—if of average intelligence—conscious of the existence or default of this mutual understanding, so important to the proper comprehension and treatment of his case.

This quick, nice readiness is doubtless a natural gift. Those who possess it are bound to cultivate and perfect it; if not cultivated indeed it will avail them little, as would the talent for music, or painting, or sculpture. Nor need those despair who are not originally thus gifted. The art of close observation, the habit of diligent and watchful attention may be acquired; the capacity of delicate apprehension may be built up and improved. Every student should make it his determined resolve—to which ever of the above categories he may belong—that he will not fail to mark every thing that may present itself to his notice, in and about the chamber and the person under his care, letting nothing escape his eye, his ear, or any of his awakened senses.

We divide the phenomena of diseases into the *objective*, those of which I have just spoken, of which we can take cognizance by sight and touch, and hearing and smell; and the *subjective*, the latter developed in and by and through the consciousness of the subject, from whom we are to derive all our information concerning them, all our knowledge of them. In the correct appreciation of all these there is often great difficulty. He who underrates the effort necessary for proper performance of his task, or enters upon it carelessly, is destined to mortifying failure. It requires indeed all his philosophy, self-possession, command of temper and acuteness. Language, as an instrument of communication, as an exponent of

feeling, is susceptible of infinite abuse and misuse, of misapplication, exaggeration, suppression of the true and suggestion of the false, either voluntarily or involuntarily; either by ignorance, indifference or design. The nice diagnostician needs all the ability requisite in a a good cross-examination at the bar.

Again: We speak of symptoms and signs with a sort of vague discrimination; vague because the terms are employed arbitrarily. We are apt, however, to reserve the word *sign* to indicate special relation, significance etymologically; we say physical "signs," not physical "symptoms;" we apply the word "symptom" more in reference to the general history, as we speak of the symptoms which distinguish the separate types of fever; the word "sign" rather in regard to the individual patient—as, the signs or indications of a nervous temperament, a lymphatic habit, a strumous diathesis, a feeble constitution. Besides this diagnostic selection, we point our prognostic; we speak of bad "symptoms" generally, but we denote some special fact in a given case as a bad "sign." Yet, it must be acknowledged that the terms are often used convertibly or promiscuously.

I propose at present to offer some brief and condensed views of certain of the phenomena of what are called Nervous Diseases, characteristically or emphatically; manifestations of disordered condition or action in the organs and textures composing the sensorial system. It is through, in and by these organs that we feel, think and know. Our individual integrity, our consciousness of self or personal identity depends upon them; it is they that connect and bring into relation with each other all the organs or parts of which we are composed. Nothing can be more obscure and inscrutable than the mode in which the several functions of this system are performed. In all other cases, our anatomical, mechanical and chemical science avails to enlighten us with some instructive suggestions and analogies; as in the valvular structures of the heart and vessels, the arrangement of the joints and ligaments, and the changes of digestion and respiration. Not so in the field now before us. A little albumen and fat and phosphorus in soft masses, or filling hollow membranous tubes—"only this, and nothing more"—serves the most wonderful and mysterious purposes. The tubes

Beale maintains to be endless, turning back in loops, not losing themselves by distribution; Rouget describes their finely granular terminal expansion in disks. At any rate sensibility or sensitiveness is so thoroughly diffused, statically, as Radcliffe supposes diffused electricity to exist in muscle, that I do not doubt the distribution every where of nervous matter, the substance endowed with the capacity of taking cognizance of impressions from without. Nor can I conceive of this capacity except as multiform; so far from being a unit, that as Brown-Sequard contends for nerves of heat or temperature, resistance or solidity and the like, in addition to the special nerves of the senses, touch, hearing, &c., so I assume as of absolute necessity the presence of nervous matter all over the surface, at least susceptible of pain in all its varied characters. The alternative of this belief in the universal diffusion of sensitive tissue or nervous matter, is simply the admission that the property or quality of sensitiveness belongs to all the solid textures, promiscuously and independently of the presence of nerve or nerve-fluid. Parts insensible in health become acutely sensitive when inflamed; neuralgia often fixes its concentrated agonies in localities of no special nervous development, proving a diffused capacity of suffering, if of no other mode of perception.

It is not probable that any physiologist or pathologist would venture to maintain the absolute electrical character of the nervous influence. An afferent nerve conducts, as the phrase is, something from the periphery to the great central column and ganglion; an efferent nerve conducts something from the centre to the circumference. By the first function it is given to us to perceive, to know; by the second, to will, to act, to move. The nerve will conduct the electric fluid, if it be a fluid, and so will a copper or iron wire; but the metallic thread will not conduct volition downwards, nor convey a sensation upwards to excite perception. Nevertheless, the books are full of assumptions or suggestions of this identity—for the phrases mean more than the assertion even of the closest analogy. Radcliffe makes the state of the muscle-fibre both in repose and contraction, depend upon its electrical condition, and Todd and others, indulge in frequent reference to the polarity, polarization and depolarization of nerve-textures. No one can

doubt the ready susceptibility of the body to electrical influences; so great is it indeed that it would seem scarcely possible to exaggerate it. Yet, surely this has been done by Radcliffe, as above, in ascribing all muscular action to such influence.* It is among the most important agents with which the animal constitution is arranged to harmonize, and without whose concurrence animal life would be imperfectly, if at all developed, heat namely, oxygen, and light. With all these the nervous fluid or force is in close accord, ready to receive and transmit their impressions and a thousand others to the seat and principle of vitality, with which it is more intimately interwoven than any other of the tissues, fluids, forces, or parts which go to constitute our complicated organism.

Among the most frequent symptoms of disease in general, are Pain, Wakefulness and Coma, Spasm and Convulsion, on which I shall proceed to treat briefly and comprehensively. Pain is a topic of so wide import that it would be vain to attempt here its full discussion; my remarks will include but a few of its vast and interesting relations. It is an almost invariable concomitant, an expression we might call it, or familiar synonym of disease. It is a simple idea, therefore indefinable—an inexorable fact, undefined. All attempts to effect such definitions are utter failures, or mere tautology. The states of sensation which are agreeable to our nature, says Stoddard, "we call properly pleasure; those of an opposite kind we call pain." This is nothing more than Plato's—"the effect of interruption of the bodily harmony." Aristotle defines it as "the reflex of bodily imperfection." Sir William Hamilton attempting to combine the two and freely paraphrasing both, tells us that "pleasure is the result of certain harmonious relations, certain agreements; Pain the effect of certain inharmonious relations, certain disagreements. Pleasure is a result of the spontaneous and unimpeded exertion of a power, of whose energy we are conscious; Pain a reflex of the overstrained or repressed exertion of such a power." "Pain in neuralgia," says Romberg, "is the prayer of the nerve for healthy blood." Is not all pain truly neural-

* It is still more exaggerated by Brown-Sequard when he affirms, as he does in his "Experimental Researches," p. 11: "I have seen muscles CREATED by galvanism and becoming as strong as they are in healthy men—in cases of lead palsy, in which the extensor muscles, as far as I have been able to judge, were completely destroyed and replaced by fibrous tissue."

gic? Anstie and Radcliffe agree in ascribing it to "low action;" "impaired vitality." I need not offer any comment upon these phrases, which it will at once be seen upon reflection, evade the point of inquiry by reference to alleged causes rather than description of the effect.

When we use the word we must take it for granted, that we understand each other, and mean the same thing. It may be dissected, so to speak, discriminated as to modes, separated under several categories distinguished by epithets conventionally descriptive; thus we talk of aching, cutting, tearing, burning, oppressive, sharp, dull pain.

It is not, as is suggested in the quotations above given and indeed very generally received, it is not the correlative of pleasure. Many parts and textures suffer pain, that are incapable of definite local gratification or enjoyment, that are indeed absolutely indifferent and unconscious physiologically. This is true of the brain substance, of the serous, and glandular and other tissues, which when diseased, become seats of severe pain. Organs and surfaces that are susceptible of pleasure may suffer correlatively or in contrast, but they also suffer in modes which possess no relevancy with their special or functional sensitiveness. Thus the Eye, the inlet of exquisite enjoyment, is shocked by deformity as it is pleased with beauty, and dazzled, confused and pained with discordant tints, as it is delighted with soft hues, and gorgeous colouring. But these are slight annoyances compared with the gratuitous and unassociated pangs inflicted by the intrusion of a grain of sand, the presence of a hair, the pungency of a wreath of smoke or a drop of acid. The Ear entranced with the soft, melting song, the soul-stirring clang of martial music and the subduing inflections of the human voice, is hurt correspondingly by the grating of harsh, rough sounds, and the jar of loud and violent explosions. Yet these are trifles in contrast with the tortures of mechanical injury and of the inflammation to which it is so often subjected.

Final causes can hardly be entirely banished from the domains of Philosophy; they must be referred to however, with much reserve always and caution. On every side we hear of the uses of Pain, as warning and protective against lesion of parts; as indicating the

point which stands in need of attention and care; nay, as suggestive often of the mode of relief required.

Sir Humphrey Davy has ventured the greatest hardihood of assertion on this point. "Pain seems," he says in his Salmonia, "in all cases to precede the mutilation and destruction of those organs which are essential to vitality, and for the end of preserving them." And again: "Pain seems intended by an all-wise Providence to prevent the dissolution of organs, and cannot follow their destruction." The facts are not as he states them, nay, not even in their seeming, and the reasoning shadowed forth is most inconsequent.—Pain does not always precede the destruction of organs; if it did, we would be forced logically to consider it as causative, not preventive. It can and does sometimes follow it. The destruction of an organ is not necessarily its death. The eye and the womb, unfitted for their physiological purposes, are often seats of intense agony. To all such eulogy I would reply farther: That Pain as warning or protective always comes too late. It is the product, the result of diseased action, which, so far from having any tendency to prevent or arrest, it excites and exasperates. If I am told that the remembrance of suffering on one occasion serves as premonition on the next, I refer to the familiar readiness with which the past is forgotten. Martineau indeed dwells on the extreme facility of oblivion in regard to suffering of every kind, as one of the happiest traits in our natural constitution. And besides this, I would ask whether men would not as well profit by the experience of loss or injury, even if painless, as we protect our persons and houses from the perils of water and fire.

It must be admitted, too, that the warning, the information, the instruction thus given is often insufficient or defective, and frequently irrelevant and illusory. Some of the most fatal diseases imply little or no suffering, as in tuberculosis and certain cerebral affections; and others that involve little danger, are full of agony, as toothache, gout, neuralgia. I would not undervalue the utility of pain as indicating the organ assailed; but let us reflect how often this is deceptive. In a febrile attack we have pain all over the body; and the most dangerous fevers commence frequently with least suffering. We can rarely depend with any confidence on this

diagnostic indication. I will not dwell on the sympathies which occasionally lead us astray: but where is the seat of Diabetes—of Leuchœmia—of Epilepsy?

It is true that the kind of pain felt is sometimes instinctively suggestive of relevant methods of relief, and here is the foundation of the exaggerated notions concerning its usefulness, upon which I am commenting. I would avoid extremes. The pain of fatigue suggests repose; the pain of tension demands relaxation; the pain of burning calls for the application of cold. Perhaps this list may be extended; let us enlarge it to its fullest natural limit. And then—what a vast number and variety of modes of Pain will remain that are purely evil, unmitigable, merciless evil. Aching in all its diversities—toothache, facial and general neuralgia, the cutting pain of this last and of the sorrowing parturient woman, the mingled lancinating and burning of Carcinoma—what shall we say of all these?

For my own part I am no stoic. I regard with contempt the stolid philosophy of Zeno. I am professionally the sworn enemy to suffering in all its forms. I will endeavour to remove it, to put an end to it whenever it is possible. I will never inflict it unless satisfied that it is the least of evils forced upon my selection, and then I shall consider it regretfully, and almost remorsefully, as the true Surgeon an amputation.

Instinct as well as reason has led all men everywhere to seek the abolition of Pain. Hence the universal delight in Narcotics, greedily sought for, discovered, invented. We hail with wide acclaim, with joyful exultation, the introduction of Anæsthetics; the Nitrous Oxyde of poor Wells, the Æther of Morton, the Chloroform of Simpson. Old Burton spoke like an oracle when he summed up the account of suffering and enjoyment for our common humanity. "For a pint of honey thou shalt find a gallon of gall; for a drachm of pleasure a pound of pain; for an inch of mirth an ell of moan; as an ivy doth an oak, these miseries encompass our life." Boyle, in his great Dictionary, places the matter in a different and very striking light. "It may be said that the days in which men enjoy their health are in greater number than those wherein they are sick. But there is perhaps as much misery in fifteen days

sickness as there is pleasure in fifteen years' health." (Pericles.)* Let us reflect too that pleasure is always fleeting—neither to be protracted nor promptly renewed; when intense, its ecstacy is momentary, and dies away in indifference, satiety and disgust. Yet I would not have you lose sight of the reverse of the picture.—While pleasure enervates and emasculates both the mind and body, pain makes heroes; develops courage, patience and defiant strength of will; and giving opportunity for sympathy and benevolence, raises man above the angels who can only pity but cannot sympathize or make self-sacrifices, in all which man approaches and imitates the God-like character.

Considering pain as a symptom in Diseases we remark that it connects itself with the most opposite conditions of the organism and its parts; with hyperæmia and anæmia, with too much and too little action; with tension and laxity; it belongs to both local and constitutional derangements, and results as well from mere functional disturbance as from structural and organic change. So far as I am aware, it is physically compensative only in its general and vague indication of the viscus attacked, and its equally vague suggestion of the mode in which the suffering originates. I need not repeat that even in these relations it is insufficient as well as uncertain, and not seldom actually delusive. Headache and gastric disorder, cerebral and cardiac affections, spasms, convulsions and numerous other instances might be offered in which it gives no sign, in which it is in no degree to be depended on, and if depended on would be altogether likely to mislead.

On the directly evil and injurious influences of pain, it cannot be necessary to dwell. It excites morbidly an already perturbed system; it irritates the part or constitution of which its very presence arouses and intensifies the irritability; it exhausts the vital power; it disorders the intelligence; inflicts fear; depresses

*H. C. Lea, in his erudite and interesting Work on "Superstition and Force," confirms this view when treating of the endless variety and unspeakable intensity of the various modes of torture invented and employed by different nations in successive ages: "These trials (he says) seem to transcend the possibility of human strength. The limitless capacity of human nature for inflicting is not complemented by a limited capacity of endurance on the part of the victim." (p. 383.) The agonies of many forms of disease are beyond imagination; not only as grievous as any artificial inflictions, but enhanced by a correlative morbid sensitiveness, a hyperæsthesia generated by the malady itself.

and dejects the spirits, and paralyses often the functional capacity of the tissue which it attacks.

The eulogists of pain have, however, generally failed to lay the proper stress upon its incidental therapeutic efficacy under occasional contingencies. Prof. Hamilton (Med. Rec. Sept. 15) assents to the ancient doctrine that pain is a stimulant—so totally inconsistent with the views of Radcliffe and Anstie, who look upon it as essentially connected with "lowered vitality"—and in surgical emergencies would not hesitate to resort to it as such. It is often employed with this purpose in medical practice. The pain which they produce, for example, makes blisters serviceable in certain stages of fevers and other maladies, in which prompt or sudden prostration threatens without actual exhaustion of the visvitæ. I was once engaged in attendance on a case of myelitis presenting paroxyms of the most acutely agonizing spasm, quasi tetanic, for the relief of which chloroform was freely administered. During its inhalation my patient was accustomed to announce the grateful approach of anæsthesia by simply raising a finger, when the remedy was withdrawn. One day a friend held the chloroform to his mouth and nostrils, standing so that I could not see the face of the sick man, but sat watching his hand for the usual signal. Thus occupied, I was startled by my friend's suddenly turning on me with the announcement, "he's dead!" which he repeated quickly and emphatically with an oath. Our patient lay before us pale, breathless, pulseless; seizing a vial of hartshorn, fortunately at hand, I lifted his eye-lid and touched the conjunctiva with my finger wetted with the sharp spirits of ammonia, and he sprang up into life again with a shrill cry.

Wakefulness—insomnia, is the next of the symptoms of sensorial disease to be noticed here. Sleep, the repose of the nervous system emphatically, the renovator of its exhausted power, is one of the most absolute necessities of animal existence. Sir John Sinclair, in his inquiries concerning longevity, declares that there was but one uniform circumstance attendant upon or coincident with protracted life. He had seen extreme old age in the glutton and the ascetic, in the drunkard and the temperate man, in the stolid and the excitable, in the fool and the wise man—but all, without an

exception, who had lived very long, were good and sound sleepers. Brigham, one of the highest authorities on insanity, announces an analogous coincidence of contrasted character here; morbid vigilance being its most frequent precursor, as we know it to be one of its most constant and unmanageable attendants; indeed he pronounces it to be prominent among its immediate causes. Protracted wakefulness, it would seem, must terminate in both bodily prostration and morbidity or abolition of intelligence. It is curious to find so respectable an authority as Laycock making light of the effect of wakefulness. He tells us that he knew a gentleman who never slept a moment for a month, yet with no bad results. Boerhaave is recorded not to have slept for six weeks, in consequence of intense study. Handfield Jones had "a patient from India, who thinks he never slept an hour for five months." Yet, Winslow, on the same page in which he refers to the case of Boerhaave, gives the story of a Chinese condemned to die by privation of sleep, and states that he survived, enduring this torture not more than nineteen days.

There must be carelessness, or error here surely. I can much more readily believe that in the strange instances above reported, there was some mistake, some hallucination, some defect of supervision, or even some wilful misstatement by an imbecile, insane, or vicious patient, than accept as true an assertion so contrary to nature, to our constant experience, and to all seeming probability.

The state of sleep has attracted strongly the attention of the philosopher and the poet, as well as of the physiologist. Some strange misapprehensions have arisen concerning it; one of the loftiest of our poets uses the phrase, "Death's twin brother—sleep." Sir Thomas More would never trust himself to "nature's soft nurse," on account of the alleged family likeness, without a prayer to Heaven for protection. Montaigne, the quaint old Gaul, also dwells on "the resemblance between death and sleep," and "wonders how carelessly we pass from waking to sleep, and with how little anxiety we lose the consciousness of light and of ourselves." Nay, the philosophical Good defines sleep as "the death or torpitude of the voluntary organs, while the involuntary continue their accustomed actions; death is the torpitude of the whole." And Bichat, pro-

found physiologist as he is, affirms similarly, that "death is but a collection of partial sleeps of the several organs and functions."

I protest against these views as full of gross error. Death implies inaction from incapacity; no such condition attends sleep; the vital organs are all in full play—circulation, respiration, nutrition, assimilation, secretion and excretion go on uninterruptedly. Death is the beginning of disintegration, destructive change: sleep is the period of renovation, restorative change. Death is the correlative and contrast of organic activity; sleep is the correlative and opposite or negation of sensuousness, sensitiveness, psychical activity. Whatever we may conceive *nervous power* to be or to consist in, and whatever source we may suppose it to flow from, and in whatever mode we may imagine it to be generated, this is certain—that it is liable to be diminished by use, or drained away, or exhausted, and thus all our capacities for action may be impaired or abolished. Its resupply is imperatively required; but whence? and how? Of course we must presuppose as fundamentally necessary a sufficiency of food for nutrition and assimilation. For sensorial purposes this must be elaborated in a peculiar and specific manner, and converted into the proper tissue or substance adapted dynamically, and in a certain sense accumulated to make up for previous subtraction and deficiency. By what organs, what textures is this elaboration effected? Todd affirms, teaching the generally received doctrine, that "the centres, the collected masses of nervous matter are the great sources of nervous power; they are the laboratories in which the nervous power is generated." I am not satisfied with this position. I am rather inclined to regard the Ganglia, great and small, the Brain, Cerebellum, Spinal Cord and the rest as places of deposit, store-houses of this force, in which it is gathered, concentrated and kept ready for the purposes of the animal economy. I would agree with the great Italian, Matteucci, who points out a more probable source of the material nervous agent. This fluid, for so he considers it, he maintains to be produced by the nutritive processes every where; "it is developed principally in the muscles, enters continually into the nerves, and from them passes into the brain, assuming in these bodies a new state which is no longer that of the free fluid; this state is that of the nervous current which

proceeds from the extremities to the brain, and returns in the contrary direction."

Radcliffe whose speculations on this subject are peculiar, and urged with much ingenuity, confounding, as it seems, the nervous with the electric fluid, has abandoned the idea of the dynamic condition of electricity or its action by currents in the natural or passive state of muscular and other parts, and has arrived at the conclusion that it exists in these parts statically, constituting, as I understand him, an essential portion of their elementary condition. I dissent from his assumption of the identity of the two agents, built, as it is, exclusively upon coincidences occurring only in muscular contraction, one of the functions in which nerve-matter is concerned; we notice none of them in the other movements and changes dependent on the presence of such matter. I readily accept his views as to the static or quiescent condition of whatever agent is engaged in the nervous functions. The currents set in motion in all modes of action, bear away the important element, which needs therefore to be incessantly resupplied. Thought, passion, emotion, intellection generally, consume it as well as muscular contraction: repose of both mind and body; inaction of voluntary muscle and suspension of reasoning and attention, allow of its restoration; hence the need of sleep.

What is the physical condition of the Brain during sleep? This question has interested physiologists the more because of the universal impression—uncontradicted, but we must admit not absolutely proved—that it is to this great centre exclusively we must look for all explanation of the phenomena. I have long contended and still maintain that the concurrence of two circumstances is necessary to the supervention of sleep. These are a subsidence, improperly spoken of as a collapse of the cerebral organs, a suspension of their activity on the one hand, and on the other a coincident fullness, vascular, probably venous, perhaps in part capillary, by which a degree of gentle pressure is made upon the cerebral substance, and passively submitted to. The bony skull is an impervious, unyielding case, which must be always full. It contains brain matter and membranes, blood of two kinds, and spino-cerebral fluid. The absolute bulk of all these taken collectively

must remain the same, admitting no obvious difference, according to an inexorable physical law. But their relative amounts may vary, and as such variation is both very prompt and quite considerable, it must, of necessity take place in the distribution of the two kinds of blood. Erethism, the tense state of action, depends on or implies fulness of one class of vessels, the arterial; the comparative laxity, or so-called collapse, subsidence from inaction or passivity, demands imperatively the filling of the other class, the venous, that the bulk of the intra-cranial mass be preserved, and a vacuum be avoided or prevented. Observers report the brain, when laid bare and watched, to be perpetually changing its appearance, even as Holland reminds us, in the condition of comparative repose; showing local fullness and collapse alternately, from moment to moment. Blumenbach witnessed the sinking of the brain in a person whenever he was asleep and a swelling when he awoke. Dendy relates the story of a woman who had lost part of the skull. When she was in deep sleep the brain lay almost motionless; when she was dreaming it became elevated; when her dreams were very vivid, and when she was awake, the brain protruded through the cranial aperture. Hammond calls sleep "a function," without sufficient reason I think. The functions of the brain are numerous and varied; but it is when least active in their performance that the state of sleep is most perfect. The experiments performed by himself and Durham, to whom he strangely refers as the original observer of facts with which the Profession is familiar, go merely to confirm the statements of Blumenbach, Dendy and Combe. But they are satisfied with half the truth, and attribute all the phenomena to the "collapse," upon which they fix their exclusive attention.

What then is this collapse of the Brain, observed whenever it is inactive? It is the opposite or contrast of determination to the organ, clearly. "An affinity for, a demand, a rapid assimilation in any part acting through its vessels," says Draper, "constitutes determination of blood to a part; this is a mingled condition of nervous action and chemical change or appropriation." Solly offers us a farther step in explanation. "The middle or muscular coat of the arteries in health, contracts with every systole of the ventricles, just sufficiently to give solidity to the wall of the pipe, so that the

force of the contraction is not lost upon a yielding surface; a much greater force is required to drive water through a leathern hose than through a leaden tube. The middle coat contracts sufficiently to assimilate the artery, physically and temporarily to the leaden tube." It is easy to see that the effect of nervous excitement upon the arterial tissue must then produce a more forcible entrance of blood into the smaller vessels and the parenchyma, and thus we have erethism, or the erectile fullness of activity—the afflux of wakefulness.

"The conditions necessary for the sleep-repose of the brain," says Handfield Jones, "seem to be essentially these two: 1. A non-excited or active state of the cerebral tissue. 2. In most instances a diminished afflux of blood to the organ." But if the afflux be diminished, how is the cranial cavity to be kept in its natural condition of fullness, unless the reflux—through the veins—be proportionally retarded? He ascribes sleep to "cerebral anæmia with contraction of the arteries;" but a page or two after, he says that "drowsiness may be associated with hyperæmia, but this is almost invariably of venous character." I maintain that it is and must be of venous character. The terms anæmia and collapse are too carelessly used to express a condition not morbid; the nutritive vessels must be normally full and active; those only which supply the erethism of intellection become lax; nutrition and nervous restoration go on best—it is scarcely too much to say, only, in sleep. If there were not this suspension of erethism, this comparative arterial sinking or laxity, there could not occur the fullness or comparative congestion in the sinuses and veins which make the pressure necessary to admit of or occasion sleep; and this is the obvious explanation of the wakefulness compelled by involuntary and persistent intellection.

Durham, and his follower, Hammond, give no consideration to the physical law recognized in the old phrase that "nature abhors a vacuum." When the skull is trephined, broken into and external pressure admitted from the atmosphere, the collapse of which they speak, can occur without its violation, as protrusion may occur. But collapse—or shrinking from the entire skull without an opening—how can that take place? Durham ventures to affirm that it does happen. He fastens a watch-glass over the opening—thus

restoring the integrity of the globe—makes the closure air-tight, and yet, sees the brain sink away from under the glass when the animal sleeps. But if there were thus a vacuum produced between the glass and the brain surface, a great physical law has been violated. I cannot accept this conclusion, and prefer to believe that there is some error in the record.

There is certainly an analogy between deep sleep on the one hand and stupor or coma on the other. I do not assert their identity in nature, but their close similarity needs no remark. Now we know that palpable pressure on the brain, however effected, will generally, if not uniformly, induce stupor. If Solly be right in ascribing the phenomena of Delirium Tremens to cerebral anæmia, we understand at once the terrible wakefulness of that malady, in which the deficiency of blood—if it exist and he is right—must be made up by increase of cerebro-spinal fluid, or serous effusion, or some other mode of filling the cranial space; the sinuses and veins being undistended with the amount of fluid requisite to make the physiological compression on which sleep depends. We comprehend too why an apoplectic, if the coats of his blood vessels have not given way and the pressure on his brain is still intra-vascular, shall be awakened from his stupor by venesection, or the cold douche or strong derivatives. Extreme fatigue and long exposure to severe cold will bring on a sleep closely allied to coma in its profound stupor and insensibility, and the difficulty of arousing the subject. An attempt is made, ingenious enough, by Hammond to discriminate from sleep the condition produced by the administration of opium and other hypnotics. The modus operandi of no single article of the materia medica is clearly understood; but the sleep from alcohol and opium if not from other narcotics, resembles natural sleep as closely as the several varied slumbers under different circumstances resemble each other. One fact is worth remembering—in coma the pupil of the eye is usually dilated; opium causes contraction of the pupil. Now Mayo and Graves both tell us that in healthy sleep, the pupil is contracted as it is from opium. We seek the recumbent posture uniformly as favouring sleep, thus promoting the flow of blood to the head and retarding its return. We press these conditions, when we obtain the soporific effect of

rocking in a cradle; so act also the oscillations of a hammock; still more the gyrations of a circular swing, and most of all and infallibly as we are told, the motion of the body lying with feet to the centre and head to the circumference of a revolving platform; the blood vehemently sent to the head by centrifugal force.

Cruveilhier tells us that if the dura-mater in a dog, is punctured between the atlas and the occipital bone, and the cerebro-spinal fluid allowed to escape, the animal reels about like a drunken man and lies down for hours in a state of stupor, but the day following he is quite recovered. Here the normal and equable pressure being suddenly abstracted, the animal suffers from the derangement; blood is unduly detained in the sinuses and veins, and stupor is occasioned. In a few hours the balance is readjusted by the effusion of the normal amount of fluid.

Pressure upon the Carotid produces very striking effects, with which I am personally quite familiar. To Parry we owe the recommendation of this very available method of palliating the tortures of headache. Romburg informs us that he has found this "compressing the carotids an effectual prophylactic in epilepsy, if employed in time in patients who have forewarnings." Hammond says it puts to sleep. I wish to heaven it would; but I have never known that desirable result follow it. In my own case the pulse becomes slow, after a while intermits and the heart labours irregularly; then ensues some dyspnœa with panting; there is some dimness of vision and dullness of hearing; intelligence and consciousness are in a degree confused or uncertain; the surface of the cheek and temple grows hot and then cold; the harsh force of the throb in the aching head is diminished and the pain lessened or suspended; but sleep, or the inclination to sleep is no part of my often repeated experience.

Kussmaul and Tenner give us the result of their experiments on six male adults. "When both Carotids were compressed there was pallor of the face with loss of consciousness, dilatation of the pupils, slow, deep, sighing, respiration, and in two cases of weak intellect, a choking sensation followed by vomiting and general convulsions." (H. Jones, p. 48.)

Brown-Séquard, speaking of this pressure "as a means employed

against headache, congestion and inflammation of the brain," says: "This treatment was employed in the view that by stopping circulation in that blood vessel, the amount of blood in the brain was diminished. But this is far from being the case. Whatever apparent good effect there may be from pressure in the region of the carotid, it has nothing to do in diminishing the supply of blood to the brain, but it is chiefly a pressure on the cervical sympathetic nerve, 'which brings about the result; for that nerve being irritated by such pressure, causes a contraction of the blood-vessels of the brain.' I need not do more than point out here the self-contradictory statement 'that this pressure has nothing to do in diminishing the supply of blood to the brain,' when he affirms immediately after that it causes a contraction of the blood-vessels of the brain." Surely contracted vessels contain a less amount.

But I maintain the facts to be as I have stated above; that pressure on the carotid does impede the flow of blood, the calibre of the artery being lessened, the force of impulse immediately restrained and rendered less grievous and harsh, and the general circulation becoming slower—with intermission of the pulse and of the heart's action. The tender cerebral mass is relieved by the suspension of the throbbing, and a whizzing in the vessel, subjectively perceived, manifests the obstruction. That pressure is often made on the nerve too, is obvious from the panting or sighing and general distress; but these annoyances do not always attend, and I am able sometimes to obtain its benefits entirely without them. Brown-Séquard himself refers to the difference of effects attainable. He enjoins the pressure to be carefully made, so as "to avoid the veins of the neck and trachea." He supposes Jacobi to have compressed them in his cases, thus described: "There is a feeling of burning heat which spreads suddenly over the head and neck, down to the chest—with a feeling of heat in the head in many. The face becomes darker, with frequently, the production of a vivid colour. An extremely painful sense of compression of the chest, a feeling of tension, weight and pain in the head, giddiness, staggering, sleepiness, sudden sleep, with stertorous breathing; in many, incipient syncope, with uncertainty in the use of the lower extremities, and sometimes sudden and entire, but transient insensibility."

These are symptoms of threatening or impending apoplexy, justly ascribable to the obstruction of return of blood from the head through the jugulars. You may in your experiment press the artery alone, or you may include the nerve, which is probably done in the usual method, or you may coarsely press artery, nerve and vein altogether, and the effects will correspond. From venous pressure, will follow stupor or sleep, or coma, with stertorous breathing and paralysis; compression of the nerve will give panting, intermission of pulse, palpitation, syncope, dilatation of pupils, heat and cold of the face and neck; of the artery, carefully made, as Parry advises, "with the thumb on a level with the superior border of the cricoid cartilage, against the vertebra," slowness of pulse, diminution of impulse, audible whizzing in the head and a sense of sinking.

In dreaming, it is probable that some external sound or touch, or some internal organic movement, stirring up, directly or by association, a definite reminiscence or feeling, arouses a corresponding portion of the Brain which undergoes erethism; awaking partially, other thoughts and emotions are excited, the action extending from the intellectional to the volitional, and the dream is put into action: this is somnambulism. Or, the emotional excitement becoming paramount, what is called trance or ecstasy takes place. I have seen a patient lie in this condition for many hours, reciting meanwhile verses of melodious rhythm and deep pathos, her eyes open and highly coloured and suffused, and pouring forth ceaseless floods of tears.

A sort of duplicate existence is sometimes developed under these circumstances. Long ago I published the case of Nancy Rector, who lived thus two separate lives by night and day; and have since seen, in consultation, another of the same nature. Both the young women carried on conversations which were connected relatively in the states of sleeping and waking, but did not intermingle; the memories of them being distinct, and their records kept apart fairly.

In the first of these instances there happened some curious physical phenomena, such as spontaneous dislocation of two or three of the joints from muscular action, replaced after some time, and much suffering also by muscular action; reminding us of the accurate

reports of Brodie, who directs our attention to "a peculiar relaxation of the joints in hysterical females, which is apt to give rise to sub-luxation." In the other there was an intensification of the power of vision, approaching the loftiest pretensions of the clairvoyant. The room which she dwelt in could not be darkened so as to render it difficult for her to discern any object, or even to read the most obscure manuscript.

The relations of Wakefulness and Sleep to diseases generally, demand attention as of high practical importance to be known and appreciated. As a familiar rule, and with the exception of those maladies of which coma, stupor, somnambulism and convulsions form a part, the state of sleep is hailed, both as a good symptom and as favouring recovery. In many fevers and pyrexia, the desirable crisis or change portending or ushering in convalescence, occurs during sleep. It is our best hope of relief in numerous forms of agonizing headache. Neuralgia is frequently suspended by it during a thrice happy interval; and catarrhal annoyances yield, at least temporarily, to its gentle sway. Malarious fevers are kept at bay, rarely invading the sleeper, even during the day, and very seldom at night; a narcotic which will put the subject profoundly to sleep a little while before the hour of expected attack will usually avert the paroxysm of an intermittent.

It is however equally true, that the state of sleep gives predisposition or ready entrance to certain diseases. We cannot always decide between this apparent tendency on the one hand, and on the other, the nocturnal changes of air and temperature, and also specific periodicity. Croup assails generally, soon after night-fall and asthma often, perhaps from the chilliness of the hour, though I doubt this, for they awaken the subject from his first slumber, even when he has been for hours warmly sheltered and clothed. But it will surprise no one who takes the view I have presented, of the analogies which associate sleep with stupor and coma, to observe the frequency of invasion of cerebral disorders at night—apoplexy, paralysis, epilepsy. Thus also we regard the occasional deaths from cardiac affections, and the horrid suffocating spasms of the victim of hydrothorax. The normal venous fullness of sleep is prompt to become abnormal or inordinate under disturbing contin-

gencies, as an unaccustomed heavy supper, excess in the use of stimulants, depressing fatigue, great mental anxiety or dejection; mere soft distention becomes congestion, sleep merges into stupor, stupor into coma, and coma goes on to paralysis or convulsion. In the histories of Insolation—sun-stroke—more frequent in India than any where else, we find an almost equal number attacked by night, as during the exposure and direct heat of sunshine. The cause probably impresses in the day; the exhaustion of long waking and perhaps the posture assumed determine the moment of development. Longmore informs us that "the invasion occurred promiscuously at every hour of the day and night." Barclay says "the attacks of Insolatio came on generally when the men were in their tents; in several instances during the night, and only in one instance on the line of march. The patient had generally been lying down, often seemingly asleep, or trying to sleep, when the attention of his comrades would be directed to him by his heavy and hurried breathing, and on attempting to rouse him he would be found insensible."

I have mentioned the familiar fact of the relief and removal of many headaches by sleep, but every practitioner meets with instances of contrasted character, in which the malady comes on during sleep, and is aggravated by every slumber, going off during the day. This may be called congestive—as the other is probably irritative or quasi inflammatory, febrile; both are neuralgic. In the former the pulse is slow and full; frequent and quick in the second.

Vertigo, which attends on headache often, is sometimes connected with drowsiness, and is capriciously related to sleep and wakefulness. Handfield Jones contends that it is aptest to occur at the moment when pressure on the brain is lessened. Thus we are giddy when we rise suddenly from stooping, or the recumbent posture, in a swing, or at sea, or when we look from a height, or at objects revolving or moving quickly, at night in darkness and when waking from sleep. "We lean upon our sight," says Mayo, "as on a crutch." This is prettily fanciful, but not explanatory.

The intimate connection between the condition of the nervous system and the Motory function, is familiarly known. We speak of certain states of the locomotive organs as nervous diseases, and

scarcely consider an argument necessary to confirm the assumption, that paralysis and spasm, and convulsion, depend upon morbidity of the sensorial power or the nervous substance, locally or generally. Paralysis, we say, arises from nervous inanition, suspension of nervous action. It is true that if a nerve be cut or ligated, the part it supplies does not move by the impulse of volition, which cannot reach it; but in the paraplegic we often observe, as Marshall Hall first noticed, that there is abundant capacity of motion, and that excitability, irritability, or whatever else we may call it, the vis insita is not diminished, nay, perhaps increased. I well remember a negro boy, æt. 16, completely paralysed from the hips down, incapable of walking, standing or emptying his bladder. If his lower limbs were subjected for a time to the passage of a galvanic current through them, and then the skin of his foot were touched with a sharp point, or even a drop of water made to fall upon his instep, a series of irregular, vehement and sweeping movements of both legs would take place. These were entirely unattended with pain or any discomfort; the boy would lie on his back laughing, highly amused with these independent and uncontrollable kickings, continued for a quarter or half an hour at a time.

When the muscles of voluntary motion contract without or against Volition, we call such contraction Spasm and Convulsion; so also when involuntary muscles contract unduly, either in degree or duration, or under new contingencies of reflex or diastaltic excitement. The two words are unfortunately used promiscuously; the books confound them every where, with sometimes a descriptive adjective to indicate a distinction.

Aitken speaks of convulsion as "universal muscular contraction, usually of paroxysmal or temporary duration"—and of "spasm" as "involuntary convulsive actions of less extent. Of these there are several varieties. (a.) Clonic Spasm consists in rapidly alternating contraction and relaxation, as in subsultus tendinum. (b.) Tonic Spasms, or spastic contractions, consist in contractions having a certain duration, attended with rigidity or hardness of the muscles, as in common cramps and tetanus." But tetanus—his example of Tonic spasm is as universal as any form of convulsion, and some cramps are of short duration. The contraction alone is

spoken of in either case, its extent and duration. I think that there are clear and well marked distinctions between the two phenomena, which I will endeavour to point out. I will not deny their seeming alliance, and it is possible they may occur together, but this is rare. I confess my surprise to find the confusion between them pervading the scientific treatises, both of Romberg and Handfield Jones. Under his order Hypercineses, Romberg has cardiac and gastric spasm, and spinal spasm as he calls Chorea hypothetically; spasms from increased reflex excitability, as he calls Trismus, Tetanus and Hydrophobia also hypothetically; and static spasms from excitement of the Brain, Vertigo and coördinated spasms, rotatory; climbing and salaam movements; and psychical, imitative and epidemic; and under the same general head of spasms from excitement of the brain, epilepsy and epileptic conditions.

Handfield Jones, massing together spasms and convulsions of all forms, and dividing them in the stereotyped way into Clonic and Tonic, attempts a distinction by suggesting that "the latter are more often the result of asthenic excitement than the former." Not so, surely. Convulsions are frequently present in the sinking and exhausted moribund. Tetanus and cramps attend a class of deaths in which asthenia is not, to say the least, the prominent condition; subjects under traumatic irritation and cholera of the briefest duration.

Radcliffe, who ascribes all spasm to "impaired vitality," looks on rigor mortis as the highest type of Spasm; but I am not satisfied that rigor or rigidity should be confounded with spasm; nay, I doubt whether either implies muscular contraction. Rigor mortis does not distort the dead body as do the choleraic cramps. When Dowler struck the biceps, it contracted in the corpse and bent the arm; but the mere rigor of the biceps does not effect this.

The most obvious and prominent distinction between the phenomena is, that spasm is always morbid, always painful, always impairs while it lasts, if it does not totally arrest or abolish the functions of the part which it affects. It implies perverted sensitiveness as well as motility; the smallest muscle, or fibre of a muscle, attacked by cramp gives pain. We know not why this should be so, nor what is the essential difference between this intrusive contraction and the

contraction of the same fibres under volition. Contrast the familiar enjoyment of ordinary or gymnastic exercise with the terrible sufferings of trismus, tetanus, uterine contraction, and, worst of all, the horrid suffocating struggles of Hydrophobia.

Convulsions, on the other hand, though among the most appalling and repulsive symptoms of disease—the rapid alternating contraction and relaxation of opposing muscles—Convulsions are not painful. Nay, Convulsion is not always morbid; it often aids and protects, rather than impedes the functional actions of parts. We have examples of this in sneezing, coughing, yawning. These surely are not painful; and to the question which I have often made of patients, I have always received a negative reply, even as to their worst form—what we call Epilepsy; they are here also attended with a gracious and happy anesthæsia, passing into stupor and sound and refreshing sleep.

How are convulsions produced? What is it that arouses the tumultuous muscular contraction? Brown-Séquard maintains that the convulsing poisons act by "increasing the reflex faculty"—indirectly therefore. Strychnine may poison fatally, however, without convulsion; an animal may be still under its influence, until irritated in some mode, when convulsion or spasm will take place. There are several "nervous centres," which being disturbed, involuntary motion, the phenomena of "turning" often, will occur. Suppose we disturb simultaneously several of these with some poison, acting dynamically, instead of inflicting on them, in our experiments, mechanical injury; and thus release from control many muscles—or, if the effect be excitant, irritate many at the same moment, will not the effect be necessary, a tumultuous series of muscular contractions—convulsion? Among the varieties of convulsion are sneezing, coughing, yawning already mentioned, vomiting, hiccup, eructation, sobbing, subsultus tendinum, chorea, the rigor of ague, hysterical, æsthetic or emotional, the psychical of Romberg and the epileptic or epilepti-form.

We must not omit to notice an obvious distinction between two classes of these phenomena, all alike as they are, involuntary and irrepressible contractions of muscle. Some of them are coördinated reflex movements which result in a definite and, it may be,

desired effect, and are thus widely separated from the category of what we may call emphatically or in a typical sense *true* convulsions, which are disorderly and in the etymological meaning of the word "tumultuous," awkward, clownish, such as chorea and epilepsy, and ague, and subsultus tendinum and that uncontrollable twitching of an eye-lid or a finger which occasionally besets us for an hour or a day, without obvious cause. Nay, I have often seen general convulsion thus ushered in by the shaking of a finger or a limb. Many others are annoyed, like myself, at times by a sudden shock which assails us on the very verge of slumber, when on a hot day, quietly and drowsily disposing ourselves for a "forty-winks nap." It almost forces one to acknowledge the analogy of nervous action with electrical excitement, which this phenomenon closely resembles.

Perhaps no other conditions of the organism exhibit in so marked a manner the transition from physiological to pathological, as these. As Virchow has said of certain cells—"you do not know what they are, unless you know where they come from;" you do not know whether a man is sneezing to get rid of a pinch of snuff, or from the tickling of light or catarrh. One of the coördinate movements is uniformly morbid, purposeless and unaccountable Hiccup. Another is rare—described in books—the salaam convulsion of the East, a regular bowing and swaying of the body. All the other coördinate convulsions are on the middle line—involuntary, irrepressible, but not altogether purposeless, not necessarily injurious, though they may become so by repetition, fatiguing and exhausting, or under morbid causation.

Sneezing may thus uselessly and injuriously persist; I have counted in a medical friend seventy-four explosions in quick succession, and instances are recorded of more than one hundred, of course exceedingly annoying and prostrating. Coughing is plainly needed and beneficial for expectoration; but it also arises sympathetically or unintelligibly in some obscure circuitous way in which it may do much harm, directly, and indirectly. Hiccup is a topic of doubtful discussion. The diaphragm and other respiratory muscles are at first brought into play, and after a while all the abdominal parietes participate in the convulsive action. Usually arising from gastric irritation, its exciting cause is sometimes undiscover-

able. I saw it in one man, otherwise well, last three days; in another seven, preventing sleep and threatening serious evil. I have just heard of a medical friend suffering from laryngeal disease, who has been afflicted for nine days with this tormentor. In 1845 I attended a lady in a miscarriage, with very large loss of blood and troublesome hiccup, supposed to be owing to her depressed and mobile condition; she informs me that she has never passed a day since—now twenty-two years and more—without a vexatious hiccup. Why it should intrude upon and disturb so large a proportion of the moribund from fever, is a problem of difficult solution. It is always an evil omen, as well as a troublesome symptom. Some poisons seem to produce it specifically; every one knows it as a familiar sign of alcoholic intoxication, and I have observed it follow the swallowing of saliva in a tobacco-chewer. Laughing, like sobbing, is a convulsion instinctive, arising from mental emotion, but also connected in some inscrutable manner with the sense of touch, as in tickling. It is as utterly uncontrollable as any other form of morbid muscular contraction. ~~Caperton~~, who classes it with sobbing and hiccup, says of it: "The muscles of expiration are in convulsive movement more or less violent, and send out the breath in a series of jerks, the glottis being open." In excess it becomes painful, inducing cramp and almost unendurable spasm and soreness. Of all human actions it is most remarkably influenced by sympathy as we call it, imitative propensity. A striking instance of this is offered by Southey in his "Life of John Wesley." This great preacher and eloquent orator was of extremely grave and sedate habits and character. "Be serious," was one of his most frequent and earnest injunctions. "He and his brother Charles," says Southey, "when in the first stage of their religious enthusiasm, used to spend part of the Sabbath in walking in the fields and singing psalms. One Sunday, when they were beginning to set their stave, a sense of the ridiculous came upon Charles, and he burst into loud laughter. 'I asked him,' says John, 'if he was distracted, and I began to be angry—and presently after, to laugh as loud as he. Nor could we possibly refrain, though we were ready to tear ourselves in pieces, but were forced to go home, without singing another line.' Hysterical laughter and that laughter,"

continues Southey, "which is as contagious as the act of yawning, Wesley believed to be the work of the devil."

Chorea, "St. Vitus' Dance," which I would term Paralysis Vacillans; and Tremor, or Paralysis Agitans, so frequent in old age, in all conditions of great feebleness, sometimes in consequence of certain poisons, sometimes annoying young and strong men and women, as it were spontaneously or causelessly, are examples of a combination between partial loss of power, and irregular, involuntary action of the remaining contractile power—of palsy and convulsion. We may place in the same category subsultus tendinum, which, like hiccup, supervenes in the advanced stages of exhausting disease, affecting chiefly the arms and hands.

All forms of Convulsion, Spasm and Paralysis, are alike regarded by Radcliffe and Anstie, as the effects of "lowered vitality." "To 1. Paralysis of the Brain belong delirium, coma. 2. To Paralysis of the Spinal Cord, Spasms, tonic tetanic convulsions, impairment of sensation, formication, pain. 3. To Paralysis of the Medulla Oblongata, clonic convulsions, epilepsy, tremors, shudderings, vomiting." Hence it would seem to follow that a more profound morbidity was expressed by spasm, persistent or continuous contraction, than by convulsion, intermittent or alternating contraction.

"Ague, febrile rigor," says Handfield Jones, "must be regarded as a kind of minor Convulsion," and Paget refers to instances in which this sub or minor character disappeared; cases, to use his words, "in which tetanic or epileptiform seizures took the place of rigors." Similar rigor or convulsion sometimes attends the introduction of a catheter into a sensitive urethra; the descent of a renal or biliary calculus along the ureter or ductus choledochus, and the formation of pus or supervention of pyæmia. Jones regards the phenomenon as "an example of the generation of spasm and paralysis by the same cause"—concurrently. This is another instance of the confused promiscuous employment of the word spasm for convulsion. It is easy to discriminate. The rigor is truly convulsive; it is not painful. The sensation and movement are precisely similar to the natural, normal shivering from cold in health. In malarious and other fevers—with the exception of hectic, he supposes, "that the rigor depends on the action of the

poison producing them on the spinal cord, throwing it into a state of undue excitability, so that the nerves issuing from it, keep the muscles in a state of clonic contraction." He ascribes "the rigors of pyæmia and of suppurating foci to the action of contaminated blood on the nervous centres with similar results." "On the other hand," he says, "those of hectic fever are probably dependent on nervous exhaustion, the centres falling into a state analogous to that existing in Chorea." But the rigors of all fevers, Hectic, Periodical and Catarrhal, are undistinguishably alike.

Some are disposed, with Billroth, to attribute the rigor of fever to the rapid increase of the temperature of the blood, so much dwelt on of late as its chief characteristic; but we meet with rigors often where no fever exists; we shiver with cold; we tremble with fear, and shake in the same way on the passage of a catheter. Fevers often supervene too, without any cold stage at all. I confess myself altogether unsatisfied with any of the explanations offered, and very anxious to find better.

Nor have we yet any clear idea of the relation of nervous influence to muscular contraction. Radcliffe's theory, formally alluded to, obtains more consideration now than it seemed at first entitled to.—"Muscle left to itself, is kept in a state of relaxation by its natural electricity; it passes into contraction when the inherent attractive force of the muscular molecules for each other is, for whatever reason, no longer antagonized by that electrical action;" "muscular contraction is ordinarily brought about in this way; the natural electricity which antagonizes contraction, is extinguished for the moment by the instantaneous electrical currents of high tension (analogous to the discharge of the torpedo) which are developed when muscle or motor nerve passes from the state of inaction into that of action." To these positions it is forcibly objected, that he makes no discrimination between healthy and diseased movements; they are all produced—sustained voluntary effort, convulsion, spasm, tremor, pain and even post-mortem rigor in the same mode; all depend on vital exhaustion—none on vital stimulation. Denying his postulate of the identity of electric with nervous force I regret his views. reject

Convulsions, emphatically so called, Epileptic, Hysterical,

Psychical, arise under conditions of the most extensive variety, nay, absolutely contrasted. It is almost universally assumed and admitted, that nervous irritability, excitability, mobility, must be increased by constitutional failure of any kind, and therefore greater of course in weak and debilitated subjects. But I never can regard Disease as a mere simple question of plus and minus; there must always be present some special mode of perversion of faculty or action. It is so here. Many strong men are subject to fits; many weak invalids escape them. If mobility be dependent on debility and results from exhaustion, the methods in which they are brought about tend to determine the results. Hall and Brown-Séquard, and the majority of pathologists, agree that the irritation must ultimately act directly or indirectly upon the spinal cord—that this is the true seat and centre of convulsion. But when an athletic young fellow is seized with an epileptic fit, which soon leaves him, apparently as well as ever, and as strong as average subjects of his age and weight and mode of life, he merely does not seem to be a subject of impaired spinal vitality. You may find in the phenomena presented proofs of mobility and irritability, but it is a petitio principii to pronounce their essential dependence on debility.

Is there any means of distinguishing between the several varieties of convulsions—have they been separated and classified satisfactorily? We speak of and define Epilepsy, but its nature is obscure; its symptoms greatly diversified, and its seat disputed.—Romberg and H. Jones places it under the head of cerebral diseases, Romberg calling it a spasm from excitement of the brain, and Jones maintaining that "the determining cause of the paroxysm and its special features, is anæmia from spasm of the cerebral vessels."—On the other hand, Hall, Brown-Séquard, Anstie and Radcliffe refer all the phenomena to spinal derangement. "The whole order of spasmodic and convulsive diseases," says Marshall Hall, "belong to the true spinal or excito-motory division of the nervous system." Brown-Séquard fixes it in the spinal cord by every method of expression. Perhaps it is worthy of notice that his language is that of the most unshrinking and frank ontology. In a great many animals, by wounding the spinal marrow, he produced convulsions which he regards and describes as "Epileptic." He tells us that

he "cured about a third of the animals thus experimented on, and then proceeds to say that he "knew when an animal was *cured*, not only by the absence of spontaneous fits, but when I could not produce a fit by giving great pain. So that I am authorized to believe that when a fit was not so produced, it was because epilepsy had ceased to exist." The tendency, predisposition or liability to be convulsed under pain, which he induced by wounding the spinal cord, he thus personifies or embodies as epilepsy.

As to the characteristic phenomena of Epilepsy, it would indeed be a wide canvass, that should contain all the features which are said to characterize it. A fully developed "Fit" must present—drawing of the muscles of the neck to one side, sudden insensibility, noisy and struggling respiration, alternate and violent and involuntary contractions of the muscles of voluntary movement, implying necessarily a fall or harsh precipitation to the ground, rolling upward of the eyes, strabismus, lividity of the face, with rapid contortions of the countenance, opening and shutting of the jaws, thrusting out and withdrawing the tongue, foaming at the mouth, relaxation of sphincters and action of ejaculators; these convulsions continuing from two to fifteen minutes, followed by stillness and stupor, passing into a profound sleep, from which the subject wakes unconscious of what has taken place. Not always, nor diagnostically, but often there occur varied premonitory symptoms—headache, vertigo, throbbing of temples, nausea, strange hallucinations, and odd sensations, as of "a cold creeping vapour, the Epileptic Aura" commencing any where and reaching or progressing toward the head, and just at the moment of falling a peculiar shriek. In many there is erection of the male organ and emission of semen; indeed Hippocrates long ago called the act of ejaculation terminating coitus—the "sunousia" of the Greeks, "a little Epilepsy." Brown-Séquard reminds us, that "after a fracture or luxation of the vertebral column, and in men hanged, erection and emission are not uncommon." He affirms, after Segalas, having proved it by experiment on male guinea-pigs, that "a transverse section of the spinal cord and its excitement by galvanism, produce the same effects." We may ask, in general reference to the supposed analogies which connect animals of different genera and

species, why it is that a decapitated chicken will be convulsed, and as Marshall Hall tells us, a decapitated calf; while a man beheaded or guillotined falls dead without such agitation.

Paroxysms of the kind described, among the most appalling manifestations of disease, may occur at long intervals; once or twice only in a life-time, and may be brought on only by rare excitements; or, they may come on frequently, and with indefinite repetition; they may also become regularly periodical at longer or shorter intervals. One of my patients was said, on one lamentable occasion to have had not less than a hundred and twenty-five fits in close succession, separated only by a few moments of quiet sleep or stupor.

Such is full or complete Epilepsy, the "grand mal" of the French, not ill named. But there is an affection known under the same title, undoubtedly allied to the above in some obscure way, yet presenting none of its diagnostic symptoms, if any are properly diagnostic. In this, the minor epilepsy, the "petit mal" there is no shriek, no falling sickness, no convulsion, no coma, no sleep, no special lividity, or flush or paleness, no laceration of the tongue, no foaming at the mouth, no torsion of the neck, no gurgling or struggle in the breathing. The most transient reverie or trance, scarce noticeable, passing off instantly; a start as if about to lose the balance; a vacant stare, with a stolid or foolish look, what the Scotch call (we have no English word for it) "a dwam;" a flash of light or a dark cloud before the eyes—this may be all. Yet this, persisting, growing more marked and enduring, intensified into vertigo, faltering, going backwards, turning round and round, with or without any peculiar sensation or aura, not unfrequently becomes developed at last into the great calamity.

Something resembling this petit mal may be brought on by pressure on the carotid properly managed. Indeed, comparing my own sensations under such pressure with those described by the subjects of that affection, they seem to me nearly, or entirely identical.

No malady is oftener feigned by malingerers; in none have more mistakes been made on both sides. It is surely best to "give the subject the benefit of a doubt." The extreme uncertainty concern-

ing its specific character, its nature and pathology must at once be inferred from the breadth of its vague definition and description and from the infinite number of causes which have been said to occasion it. For my own part, I find it difficult to recognize as the same identical affection, pathologically considered, a musculo-nervous tumult, arising in a child from the irritation of teething or worms, and that which precedes scarlatina or small-pox; in an adult, convulsions from the pressure of a tumour in the brain or a spicula of bone pricking the dura mater, and those from the annoyance of a bit of glass in a nerve on the thumb, or the growth of a sesamoid bone on the great toe; convulsions from anæmic poisoning, and those from mere sympathy or imitation, as in an interesting case related by Prof. Flint, in which he makes a positive diagnosis, and pronounces the attack "a distinct epileptic paroxysm." In the same connection he relates from Prof. Dalton's personal observation, an instance of the same kind "in a dog not previously affected with epilepsy, in company with another dog who was subject to it, the latter being seized with an epileptic paroxysm, the former immediately had a similar paroxysm."

Of the convulsions of children, we are told that "their non-recurrence affords the only proof that they are not epileptic." What name shall we give them then? What is the pathological difference? The case I have just referred to as diagnosticated by Prof. Flint himself, to be "a distinct epileptic paroxysm" was non-recurrent. He tells us "she had never before had an attack of epilepsy, nor did another paroxysm take place, the person remaining within my observation for several years afterwards."

Every theoretical—pathological—explanation of the phenomena hitherto offered, is exceedingly incomplete and unsatisfactory. Take Marshall Hall's for instance. The first is alleged to be a spasm or contraction of the muscles of the neck; this obstructs the return of blood from the head; coincidently or consequently, spasm of the glottis takes place, producing suffocation, and followed by convulsion of the trunk and limbs. Now there are at least three points unaccounted for. 1. We know not why the muscles of the neck have contracted and drawn the head to one side. We must with Brown-Séquard, presuppose the unknown something or condition,

which we call Epilepsy, to show any reason why the spasm should happen. 2. Equally causeless seems the laryngeal spasm. 3. No attempt is made to point out why the suffocation or the venous turgescence in the head should give rise to convulsions. We have them without either, as where there is a tube in the larynx, and in a pale anæmic patient, and in hysteric and psychical attacks. They do not belong to the history of Apoplexy or of Croup. Next let us consider Todd's views, accepted as at least probable by Flint and so many other recent pathologists. "He attributes the malady to an abnormal development of nervous force, which manifests itself in the epileptic paroxysm, as a leyden jar when charged with electricity to a certain state of tension gets rid of the disturbance (?) by the disruptive discharge. This undue force he attributes to the accumulation of some material in the blood, which acting on the brain as a poison, excites the disruptive discharge, leaving the nervous system free from disturbance, until a fresh accumulation excites a new paroxysm." (Flint, in loco) This may be admitted as accounting for toxic convulsions in an emphatic sense, those connected with renal disease or paruria, the exanthematous and those following the administration of known poisons, Strychnine, Datura-Stramonium, &c.; but surely it will not apply to Brown-Séquard's traumatic epilepsies, nor those from sexual excitement, sudden emotion, irritation or sympathy. These humoral doctrines, however plausible, and containing doubtless an element of important truth, are very partial and limited in their application.

Handfield Jones argues on the other hand, that "the effective causes of Epilepsy, are mainly dynamic, generating no poisonous matter." Copland endorses Esquirol's statement, that "fits of passion, distress of mind, and venereal excesses hold the next rank to terror "in exciting the disease." In this connection, Maisonneuve's cases, so often referred to, are highly interesting. "Eighteen sailors, having saved themselves on a rock, by swimming away from the enemy, were for several days exposed to great privation and severe cold; four weeks after they had been received into hospital, they were seized with epileptic attacks, before and after which they suffered violent pains in the right hypochondrium. When ten months had past, six were dead; eighteen months later eight more,

only four surviving." (Romberg, in loco.) But we are still at a loss to know how, and by what modification of their impression any of these causes determine convulsion.

What is the condition of the brain and nervous system just before and at the invasion of the paroxysm—the "causa sine qua non?" We shall be driven, I fear, with Brown-Séquard, to the ontological conclusion that unless "Epilepsy" be present, materially or metaphorically, virtually or physically, the convulsions will not follow either the fright, or grief, or anger, or pain, or heat, or cold, or pleasure, or food, or drink. "Copland's long list of premonitory symptoms," says Jones, "may be summed up as indicating, all of them, the abnormal irritability or incitability, associated with a varying blood-flow, which may or may not be in excess." The sudden and complete insensibility of the "Grand Mal," the giddiness and brief unconsciousness of the "petit mal" seem to him capable of being explained only "by a suddenly induced anæmia of the hemispheres, and the convulsions are consequences of the same state of the medulla oblongata and the meso-cephalon. That the cerebral anæmia is not the result of mere syncope, we are sure. There seems then nothing left but to *assume* that a sudden constriction of the cerebral arteries occurs." Thus we have the elephant adroitly placed on the back of the tortoise. But whence the initial movement; what causes or brings about the assumed indispensable spasm of the arteries? Are arteries liable to spasm?

Our author intimates that other forms of Convulsion may arise from "direct cerebral irritation, but these are epileptiform, not true epilepsy." And again, "Epileptiform Convulsions may be brought on also by arterial spasm, acting without the previous abnormal state of the encephalon," of which he gives as example, "the Malarious Epilepsy" of Mackay, Payne, and Lowe. Ingenious as are these suggestions of Jones, they are by no means satisfactory. I would add to the train of connected contingencies, one which he has overlooked. When anæmia takes place, as he points out from spasm of the vessels supplying blood to the encephalon, there must ensue instantly a correlative fullness of the venous sinuses and trunks—from atmospheric pressure and "in horror of a vacuum," thus inducing a condition resembling that of sleep, and indeed

bringing on stupor and coma. "It is a point well worth remarking," says he himself, (933) "that when the arteries are contracted by cold, the capillaries and veins are often filled with venous blood."

This state of things is surely very different from the syncopic character of the unconsciousness from mere anæmia. Brown-Séquard recognizes this difference distinctly enough. "The loss of consciousness," he says, "depends altogether, in the beginning of the attack, on the contraction of the blood-vessels of the cerebral lobes, producing in these parts of the brain, a state of syncope." So positive is he on this point, that, like his illustrious predecessor, Marshall Hall, he ventures to recommend therapeutical measures of the most heroic character suggested by his theoretical dogma. As Marshall Hall advised laryngotomy to arrest the morbid movement at an early step, so Brown-Séquard proposes a method of striking out a link in the evil chain farther onward.—"The loss of consciousness, which occurs in the petit mal" he assures us, "may be avoided altogether by the extirpation of an inch or an inch and a half of the cervical sympathetic nerve. The teachings of physiology, and pathology, and particularly the results of my experiments on animals *rendered epileptic*, conclusively show that there can be no chance for a loss of consciousness after this operation has been performed. If surgery should be bold enough to divide this nerve, (which perhaps may be before long) a great advance might be made in the treatment of Epilepsy." We know that tracheotomy has not always succeeded in the prevention of convulsions, and that epileptic paroxysms have taken place when the larynx has been tubed and open. Should Brown-Séquard's proposed excision of nerve be equally partial in effect, humanity will lose rather than gain by his suggestion; the total unconsciousness of the afflicted patient throughout the horrible tumults which agitate his frame, forms the only feature of the shocking scene, upon which the mind can bear to dwell.

Where shall we class the convulsions which precede death from hæmorrhage? Hall regarded them as proving the exclusively spinal relations of the muscular agitation because they occurred, equally, when the animal was decapitated. I have twice witnessed strong convulsions following the use of the lancet in subjects not

epileptic, bled to relieve the symptoms of violent determination to the head. There was no repetition of the attack in either case; both were adults beyond middle age; one was a man, the other a woman. Where shall we arrange the Eclampsia of the parturient woman? Convulsions are not more likely to supervene during the labour of an epileptic patient, we are told, than of a woman not epileptic. On this point, I entertain some doubt; but I agree with those who maintain that an attack of puerperal convulsions does not seem to generate a tendency to recurrence, or lay the foundation for future epileptic seizures. Marshall Hall, who regards this as resembling the epileptic convulsion, offers a vague diagnosis, and tells us that "it is preceded by a hissing respiration. It is attended with great danger; the coma induced by it is very deep, and the cerebrum obviously much affected."

But epilepsy is rarely fatal directly. Now if we read over the bills of mortality everywhere published, we shall find that they always record large numbers of deaths, set down to "convulsions." In a valuable table of mortuary statistics for the City of New York, for thirteen years, "Convulsions" stand second on the list of causes of death, "Consumption" being of course first—37.038; Convulsions 23.063. As it is very rare to see a death from typical epilepsy, these convulsions must have been of different character. Indeed, a neat and precise diagnosis of epilepsy would not necessarily include convulsions, whether with Brown-Séquard we regard it as a morbid state underlying and giving rise to the tendency to convulsion, or with pathologists generally look upon the petit mal as one of its forms.

On the whole, I am disposed to consider Convulsion as a symptom merely, not a distinct disease in any of its forms—Epilepsy, Hysteria, or any other. It may be characteristic as in Chorea, whose existence we can scarcely imagine without it, but is generally insignificant. It is a forerunner of death, familiarly, but I hardly think it ever the cause of death. Like hiccup and subsultus tendinum, general convulsion is often the immediate precursor of dissolution in a great number and diversity of maladies. As an unmeaning term, then, I would have it struck out of our register and bills of mortality.

I shall not presume to enter into any intimate description of the Hysterical Convulsion. Nothing can be more obscure, more capricious, more difficult to comprehend, more vague in diagnostic description. If not exclusively a feminine affection, it is misnamed; it certainly betrays almost uniformly its sexual origin and connection. Except the general physical hyperæsthesia and moral mobility and excitability, there are no premonitory conditions. The paroxysm comes on with elation of spirits or depression, with tears or laughter, with anger or tenderness; there is constriction about the throat—globus hystericus, the passion of poor old Lear—yawning, hiccup, pain at the epigastrium, shivering, chattering of the teeth and general convulsion. This lasts much longer, for the most part, than the epileptic, and is often attended with hissing respiration. The tongue is never, so far as I have seen, protruded or bitten. Tears frequently stream from the eyes, which are red and suffused, and often turned up. After a time—five to fifteen minutes or more—the fit terminates abruptly, sometimes with sobbing, sometimes in sullen silence, rarely in coma or sleep. It has, however, been well ranked as the chief of the mimoses, putting on the appearance of apoplexy, epilepsy and catalepsy. Both Hysteria and Catalepsy, like Trance, Ecstacy and Somnambulism, are conditions of the nervous system, readily brought on by mesmeric manipulations. It would require a volume to discuss them in any detail.

One of the most characteristic phenomena of the hysteric paroxysm, almost, if not absolutely diagnostic when it occurs, yet, not diagnostic or not absolutely uniform, is the flatulent distention, so annoying, both of the stomach and intestines. I have seen the stomach so enormously filled with flatus as to press up the diaphragm and push the heart over diagonally towards the right shoulder with intense dyspnœa and much pain. It is probably dependent upon paralysis of the muscular coat of the great organ of digestion, and of the smaller bowels.

Anæmia and other debilitating causes are alleged to predispose to hysteria; all sexual irregularities excite it. No known alteration in the brain or spinal cord belongs to its history. Yet its frequently repeated occurrence always presents a degree of danger

of the supervention of insanity, imbecility or epilepsy. From the latter it is strongly contradistinguished in typical cases by its marked hyperæsthesia; while epileptics are unconscious from the invasion, in hysteria the perceptive powers are never abolished, even during violent attacks; stimulants and irritants continue to make their impression on the sensitive nerves; the patient in the fit still starts when a loud noise is made, usually hears voices about her, and shrinks from light.

It is not an easy matter to fix the pathological place of Catalepsy. It is not properly either a convulsion or a spasm—the muscles seem simply rigid, yet they do not strongly resist efforts upon them to make either flexion or extension. Its alliances with other nervous affections, are uncertain and obscure; closer, I think, with hysteria than any other; I once saw it associated apparently with epilepsy. Handfield Jones calls it "a disorder intermediate between epilepsy and tetanus, with both which it has affinities. It resembles much (he says) the variety of epilepsy termed tetanic." But in tetanus the muscular contraction—a true spasm—is extremely painful. All cramp, the same author tells us, even the cramp of the swimmer, brought on by exertion or cold, is a small tetanus. We know that all cramps are painful. The rigidity of catalepsy is not painful, the consciousness not being always impaired. In cases quoted by him, consciousness was but partially abolished, and pain is not mentioned.

In Chorea, I have long taught that we have a mingled condition; the phenomena "partaking as much," to use the language of Jones, "of undue mobility or convulsion, as of paralysis," and Romberg asserts that "convulsions of epileptic character, often complicate the Chorea of pregnant women."

In the attempt to locate the direct or proximate cause of these dynamic disorders, Handfield Jones maintains that "much depends on the group of nervous centres, most readily affected with morbid action. If it be the spinal cord, we have tetanus; if the medulla oblongata and adjacent superior region, epilepsy; if the meso-cephalon alone, we have so-called, hysteria; if the hemispheres alone, we have the 'petit mal,' or apoplectiform cerebral congestion."

I will conclude with a brief notice of what has been called by

Rombag "Psychical Convulsion," I know no better name for it, Emotional, Sympathetic, Religious, Political, the true Morbus Comitialis. We have historical records of it in ancient times, of exceeding interest. It has been affirmed that the Priestesses of the old Pagan oracles were intoxicated by the fumes of certain volatile narcotics, and such may have been the fact. But the supposition is by no means necessary for the explanation of the incidents that took place. The mind itself is entirely capable of producing the state of trance described, with or without convulsions, by its own vehement introverted working. We know, concerning a popular writer of this City (Philadelphia), that, after having become familiar, as a very susceptible subject, with the condition brought on by mesmeric manipulation, he could, in solitude reproduce in himself, the same state, mental and physical, at pleasure. I once saw harsh convulsions occasioned in a healthy and intelligent gentleman, of fully ordinary firmness and strength of character, by an abortive attempt on the part of a mesmerist to put him to sleep; and I am well acquainted with a distinguished authoress, who carried about with her a charmed or magnetized gold pencil-case, by intently gazing on which, she could bring on a convulsion of her whole frame, very unpleasant to witness.

It would seem, indeed, that all the forms of convulsions, vaguely described, may be excited by sympathy and imitation; it is the peculiarity of that of which I am now speaking that it has no other source. It is not connected with any defined mode of predisposition. I have not observed that anæmious or hysterical women are specially susceptible of it, nor are the weak more liable than the strong. As in ancient times, religion and politics were the chief emotional excitants of the race, so they are now. But now we rarely or never meet with any such results of political excitement; our political faith is not earnest enough; our political zeal, though fiery, is not sufficiently sincere; we agitate chiefly for party predominance and selfish purposes, and our newspapers afford an outlet to the more irrepressible. The morbid comitialis of the classical writers—usually, but I think erroneously referred to as epilepsy—was met with, familiarly we are told, during the heated meetings of political assemblies. Now we have a morbus comi-

tialis, but it is emphatically pietistic or religious, and rarely met with outside of two well-known sects, who cultivate and favour emotional devoutness. History records many details of this affection, among them none however more strange than the wonderful sufferings and miraculous capacities of endurance of "the convulsionaries of St. Medard."

I formerly took an especial interest in the manifestations of this nature in our own country, then far more common than they are now, and obtained the opportunity of examining a large number of cases. Under the eloquence of a gifted preacher, I have seen men, women and children fall suddenly; some collapsing, as in syncope, some passive as in apoplexy, and some thrown down violently, with fierce cries and contortions, bruising themselves, hurting those with whom they came into collision, and exciting a strength surprising to all who attempted to restrain them. "At the sermons of St. Vincente Ferrer," says his biographer, "the audience were all tears, groans, exclamations, faintings and strange symptoms; trembling, as in agues, struck speechless and immovable as if they were statues."

Between thirty and forty years ago, these forms of religious excitement became, so to speak, epidemic, spreading widely over the Western and Southern States. "The Kentucky Jerks," as they were called, though probably commencing in East Tennessee, originally rooted in pietistic emotion, came at last to affect great masses by mere attention, and a sort of sympathy, difficult to appreciate; for it did not involve any community of sentiment or interest, but spread, like laughter and yawning, involuntarily and unexpectedly, seizing young and old, males and females, the good and bad, the indifferent and the reluctant alike. One of the noted politicians of the day, frequented the meetings where these phenomena were oftenest seen, and took notes for a history of their occurrence. But he was forced to desist, from finding that he was becoming unable to write; his arms and hands being attacked with irregular and unwilling movements beyond his control, and he was glad to escape from the agitated crowd. A venerable pastor of a Presbyterian Church, in which all such exhibitions are held in abhorrence, was denouncing in his pulpit with scorn, these "phys-

ical exercises," as delusions of the devil, when to the amazement and consternation of his audience, and his own unspeakable horror, he was seized violently with the Jerks ! One of his elders, a robust and self-willed individual, was profoundly scandalized at this event, and indulged in harsh comments upon the weakness of his unfortunate minister. The very next Sunday, however, he himself was attacked in the most humiliating manner, while walking up the aisle, in full view of the congregation. For many years after, he continued subject to these fits, of which he was so much ashamed, that if he could at any time anticipate their invasion, he would retire to the solitude of the forest, there to suffer without a witness.

I have before me a simple and graphic history from a young and intelligent preacher, of his encounter with this epidemic, and the great embarrassment it caused him. The "exercises" were curiously diversified; by no means confined to jerking or mere muscular convulsion, the subject making strange noises, barking like a dog or a squirrel, mewing, &c. None, so far as I can learn, were fatally affected, or suffered any greater injury than the annoyance of repetition. Some seemed even to take pleasure in the "exercises," and sought the excitement that renewed them. As in hysteria there was obviously in many of the female patients, a mingled, perhaps unconscious, action of volition. Not a few of the men, and chiefly among those who had previously denounced the weakness, and were afterwards overcome by it, were full of disgust, shame and self-reproach. I was present when a celebrated black preacher, an elève of the missionary Blackburn, fell prostrate in the midst of a sermon, none of his hearers being affected. He had become, by repetition, very liable to such attacks. Throughout the whole strange and painful scene, he retained his consciousness, and at intervals was able to speak distinctly. He was violently agitated, and being a large and strong man, it was a difficult task to those who held him, to prevent his injuring himself by the convulsive flexion and extension of his powerful limbs; and I could not help being touched with his humble apologies to them for the shocks and hurts he was inflicting upon them.

An amusing account of its irresistible domination, comes to us

from a gay young fellow, who became its astonished and most unwilling victim. He was the son of an elder, and to avoid going to meeting on a certain Sunday, he feigned to be sick and was left at home alone. He lay in bed chuckling and congratulating himself, and gradually bent his thoughts on his family and their ride, reached with them in his wandering thought, the camp-ground, saw the multitude assemble, "the services" commence, and at last "the exercises," as they were called, in full operation. Of course, one young woman was especially before his mind's eye, and he now fancied her under the complete influence of the familiar excitement, and in the agitation of a paroxysm. "Now!" he exclaimed to himself, with strong sympathetic interest; and in a moment he was himself taken, hurled out of bed, and jerked hither and thither, all round the room, up against the wall, and in every direction. He found himself perfectly unmanageable. He had heard that praying would cause the Jerks to cease. He tried it, and the desired effect followed immediately. After panting a little, he felt no more effect from it this time, "than a person does after hiccup." At his ease, he allowed his imagination to run riot again, and again the same scene of tumult and helplessness was acted over, only rather more vehemently. The efficacious remedy was again resorted to with success; and now thoroughly frightened, he rose, dressed himself and sauntered about the premises. I will not pursue the story further in detail; suffice it to say, that twice more he was assailed with increasing force and diminished capacity of endurance, until he was perfectly reduced to humble and prayerful submission.

It is quite clear that the malady did not extend itself exclusively by means of religious excitement. From a respected correspondent, residing in a community where it became familiar, I have the following statement: "The first of our cases originated in a church, where there prevailed a vociferous mode of worship, with much devout enthusiasm, and I did not hesitate to attribute all the attacks to religious excitement. But that opinion has been shaken by the fact that the disease has attacked persons, who never attended that church, and who feel no interest in the cause of religion, or seem

at all concerned for the safety of their souls. Nor does sympathy seem to account satisfactorily for the wide-spreading of the affection. I recollect the circumstance of an old man being attacked while under the influence of spirits, and when perfectly alone on his way from a grog-shop. In all the cases, the same muscles are alike affected, chiefly those of the neck. There was usually a paroxysm every ten minutes, during which the head was thrown backwards and forwards with astonishing rapidity." This gentleman pronounces it an Epidemic Chorea.

Another medical friend, writing to me, says that his patients were chiefly females, only two males being among them. The convulsions began by contraction of the muscles of the neck, were extended to the abdominal muscles, and then became general. The pulse was usually slow—from 55 to 60 in the minute, and in some intermittent. Embarrassed to account for its broad sway over the country, he declares it "contagious."

A third, who has studied it closely and attentively informs me that "a very singular feature of it in his neighbourhood is, that it most commonly attacks strong, corpulent men, rarely assailing weak women or indeed women of any constitution. The symptoms which usher it in are as follows: A sense of chilliness is felt throughout the whole frame, with a partial or entire loss of vision, great restlessness and a sensation of choking or smothering; after a time the muscles begin to contract involuntarily, the subject loses his reason, throws himself often on his hands and knees, in the attitude of a dog; his eyes are turned upward, and he commences to utter the peculiar noise, which has occasioned it to be spoken of as "religious barking and mewing;" the sounds indeed are in many instances, as much like the barking of a dog, as the modification of the human voice will admit. Thus he remains, unless removed by friends, until he is exhausted, when he falls to the ground, convulsed in the most violent manner. Many have been attacked who were not at all under the influence of religious excitement; and some assailed while merely listening to accounts of its mode of occurrence. In some it persists for years intermittently."

We have entered here upon the vast field of Psychical Pathology,

in which the landmarks are indistinct, and the course of inquiry difficult and uncertain. We have neither time nor space, at present, to pursue a discussion of such obscurity and interest, and must postpone them until some future period, when we may hope to attain a clearer insight, to get possession of more available materials, and to have become better prepared to undertake a task so arduous.